AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.2.2 ANIMAL TISSUES, ORGANS AND ORGAN SYSTEMS (PACK 4)

SCORE	PERCENTAGE
/208	%

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Q1.

(a) (i) villus

1

(ii) its outer surface is one cell thick

*cancel **1** mark for each extra box ticked*

1

it has a large surface area

1

it has good blood supply

1

(b) diffusion

1

[5]

Q2.

(a) (i) B **or** D

1

(ii) A **or** B

1

(b) any **four** from:

more / faster must be implied at least once for full marks

- increased blood (flow)

  ignore reference to breathing

- (more) oxygen supplied **or** aerobic respiration

  *allow less anaerobic (respiration) **or** and prevents oxygen debt*

- (more) glucose / sugar / food supplied

  ignore feeding

- (higher rate of) respiration

- (more) energy needed / released

  allow made

- (more) carbon dioxide <u>removed</u>

- (muscles) doing (more) work **or** muscles contracting

- remove heat / cooling

- remove lactic acid **or** less lactic acid formed

4

[6]

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Q3.

(a) any **two** from:

- arthritis
  allow damaged joints
- diabetes
  accept high blood sugar
- high blood pressure
- strokes
  allow blocked blood vessels / thrombosis
- allow breathing difficulties
  ignore cancer
  ignore high cholesterol

2

(b) (i) any **two** from:
to gain marks there must be a comparison
ignore comparison at single age

- lower number of women deaths up to age of 75-80
- higher number of women deaths after 80
  *ignore women die older **or** men die younger*
- men's peak higher
- men's peak at an earlier age
- men's death start earlier than women
- more men than women die of heart disease

2

(ii) any **two** from:

- men smoke more (cigarettes)
  ignore alcohol
- more men smoke
- men under more stress
- men less active
- more men overweight / eat more / less diet conscious **or** different fat distribution
  ignore reference to body size
- genetic factors
- men might have lower metabolic rate

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ignore references to hormones

- men less likely to visit doctor even though they have symptoms

2

(c) *points can be in any order*

laboratory tests / tests on tissues
or
tests on animals
or
tests for toxicity

ignore computer simulations

1

tests for side effects on volunteers / healthy people / small numbers

1

widespread testing
or
testing for optimum dose
or
test on patients / sick people
or
test to see if it is effective

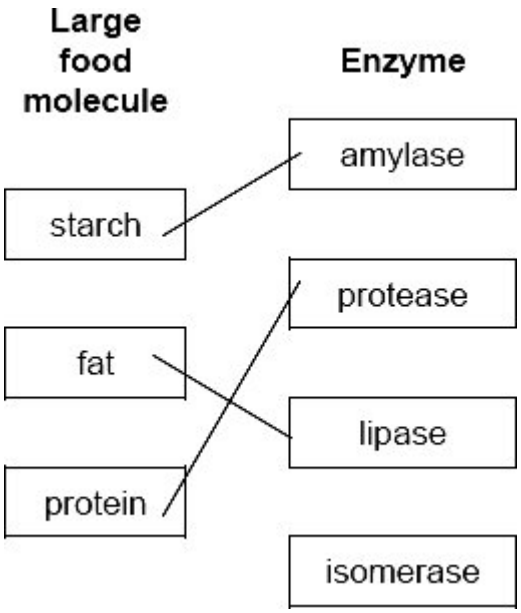
accept use of placebo

1

[9]

Q4.

(a) (i)



*all three correct = **3** marks*
*two correct = **2** marks*
*one correct = **1** mark*
extra line from a large food molecule cancels the mark

3

(ii) sugars

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1

fatty acids and glycerol

1

amino acids

must be in this order

1

(b) liver

1

[7]

Q5.

(a) B

no mark for ÉBÉ, alone

large(r) surface / area **or** large(r) membrane

accept reference to microvilli
accept reasonable descriptions of the surface
*do **not** accept wall / cell wall*
ignore villi / hairs / cilia

1

(b) (i) any **one** from:

- insulin / hormone
  if named hormone / enzyme must be correct for pancreas
- enzyme / named enzyme

1

(ii) <u>many</u> ribosomes

1

(ribosomes) produce protein

accept insulin / hormone / enzyme named is (made of) protein

or

allow <u>many</u> mitochondria (1)

provide energy to build protein **or** to make protein (1)

accept ATP for energy

1

[4]

Q6.

(a) stomach is acidic / has low pH

allow any pH below 7
ignore stomach is not alkaline

1

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lactase works best / well in alkali / high pH / neutral / non-acidic conditions

allow any pH of 7 and above
accept works slowly in acid conditions
*allow figures from table with a **comparison***
ignore reference to temperature

1

(b) any **three** from

- (below 45(°C)) increase in temperature increases rate / *speed* of reaction
- reference to molecules moving faster / colliding faster / harder / more collisions
- optimum / best at 45(°C)
  allow value(s) in range 41 - 49
- high temps / above 45(°C) (rate slows due to) denaturation of enzyme /lactase
  *allow synonyms of denaturation but **not** killed*
  *denaturation at high **and** low temperature does **not** gain this mark*
  ignore body temperature
  ignore references to time / pH

3

(c) any **two** from

- acid neutralised **or** conditions made neutral / alkali
  accept bile is alkaline
- (allow) emulsification / greater surface area of fat / lipid
  allow description of emulsification eg fat is broken down / broken up into droplets
- enzymes (in small intestine) work (more effectively / better)
  allow better for enzymes

2

[7]

Q7.

(a) B

1

(b) Narrow(er) small(er) / thin(ner)(air) passages / bronchioles

allow muscle fibres are contracted
allow oxygen instead of air

or less air can pass through

ignore reference to surface area

or harder for air to enter

1

(c) (i) salbutamol causes relaxation / reduces contraction

1

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(ii) widens / enlarges / bronchioles / (air) passages

allow oxygen instead of air

or allows air through more easily

or allows person to breathe more easily

1

[4]

Q8.

(a) (i) 120

1

(ii) 11 760 **or**
correct answer from candidate's answer to (a)(i)

correct answer with or without working

if answer incorrect

120 × 98 ***or***
candidate's answer to (a)(i) × corresponding SV gains ***1*** *mark*

if candidate uses dotted line / might have used dotted line(bod) in (a)(i) ***and*** *(a)(ii) no marks for (a)(i) but allow full ecf in (a)(ii) eg 140 x 88 = 12320 gains* ***2*** *marks*

2

(b) trained athlete has higher stroke volume / more blood per beat

1

same volume blood expelled with fewer beats

or for same heart rate more blood is expelled

1

(c) increased aerobic respiration

or

decreased anaerobic respiration

allow correct equation for aerobic respiration

accept don't have to respire anaerobically

1

increased energy supply / need

1

less lactic acid formed

or to breakdown lactic acid **or** less O_2-debt

1

can do more work **or** can work harder / faster / longer

accept muscle contraction for work

or less fatigue / cramp / pain

1

[9]

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Q9.

(a) opaque / less transparent / blue

allow mixture becomes dark / black

ignore thicker

1

(b) (i) 7 (minutes) **or** in range 6.7 to 7

*award **2** marks for correct answer*

if answer is incorrect evidence of selection of 40(% light intensity) either in working **or** in graph 2 for **1** mark

2

(ii) any **two** from:

- slower / takes longer at lower temperatures
- (40^{o}C is) optimum / best temperature

  allow near to 37^{o}C / body temperature where enzymes work best
- enzyme denatured / destroyed / damaged at higher temperatures

  allow description of denaturation

2

(c) (i) isomerase

allow phonetic spelling

1

(ii) fructose is sweeter than glucose
needed in smallerquantities **or** less is needed

2

[8]

Q10.

(a) (i) artery

1

(ii) capillary

1

(b) alveoli

1

red blood cells

1

nucleus

1

[5]

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Q11.

(a) (i) 19 800

for correct answer ignore working or lack of working

*165 × 120 but no answer / wrong answer = **1** mark (ignore extras)*

2

(ii) any **two** from:

- for respiration
  ignore oxygen debt
- energy released
  allow energy produced
- prevents anaerobic respiration
- prevents build-up of lactic acid

2

(b) any **two** from:

- increased breathing rate(*)
- increased depth of breathing **or** deep breathing(*)
  *(*)more breathing is max **1** mark*
  ignore increase in heart rate
  allow heavier breathing
  *do **not** allow harder breathing*
- dilation of arteries / vasodilation
  allow blood vessels dilate
  *do **not** allow veins / capillaries dilate*
- blood diverted from elsewhere
  ignore name of organ

2

[6]

Q12.

(a) any **two** from:

- age
- gender
- mass
- number in group
- time

2

(b) any **two** from:

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- highest (mean) mass loss on Rosemary Conley **or** Rosemary Conley most effective
- least (mean) mass loss in control group **or** mean

2

(c) (Atkins)

costs least

1

mass loss very similar to other diets **or** second highest mass loss **or** as effective as other diets

1

(d) any **two** from:

- (exercise) increases metabolic rate / respiration
  ignore sweating
- (exercise) needs / uses energy / calories
  allow burns fat / calories
  *do **not** accept energy <u>for</u> respiration*
- (this) energy comes from food / fat
- less food / energy/ calories converted to fat

2

[8]

Q13.

(a) (i) B

1

(ii) any **one** from:

- largest area of / most digestion (of lipid)
  allow agar / jelly / mixture broken down / digested
  *do **not** allow digestion of bacteria / lipase*
  *ignore digestion **by** bacteria*
- largest clear area

1

(b) any **two** from:

- effect of pH / pH described
- effect of temperature
- effect on different types of lipid / fat
- cost **or** allergic reactions **or** effect on skin / fabrics / **or** environment **or** interaction with other chemicals in powder **or** shelf life

2

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(c) enzymes / named enzyme denatured / destroyed

allow active site(of enzyme) altered

1

[5]

Q14.

(a) A = alveolus

allow air sac / alveoli

1

B = diaphragm

ignore labelling of C and D

1

(b) A

1

(c) (i) red blood cells

1

(ii) plasma

1

[5]

Q15.

(a) A

no mark – can be specified in reason part
if B given = no marks throughout
if unspecified plus two good reasons = 1 mark

high(er) pressure in A

allow opposite for B
do not accept 'zero pressure' for B

1

pulse / described in A

accept fluctuates / 'changes'
allow reference to beats / beating
ignore reference to artery pumping

1

(b) (i) 17

1

(ii) 68

accept correct answer from candidate's (b)(i) × 4

1

(c) (i) oxygen / oxygenated blood

allow adrenaline
ignore air

1

glucose / sugar

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extra wrong answer cancels eg
sucrose / starch / glycogen / glucagons / water
allow fructose as an alternative to glucose
ignore energy
ignore food

1

(ii) carbon dioxide / CO_2 / lactic acid
allow CO2 / CO^2
ignore water

1

[7]

Q16.

(a) any **two** from:

- neutralises acid / makes conditions alkaline / raises pH
- enzymes (in small intestine) work (more/most effectively) **or** stop/prevents enzymes being denatured
- emulsifies fats/lipids **or** description of emulsification
*do **not** accept breakdown unqualified*
- larger surface area

2

(b) (i) bile / bilirubin / pigment / broken down haemoglobin / substance / cholesterol linked to movement **or** effect

1

does **not** get to the intestine / food / faeces
or cannot leave liver **or** effect not happening (in intestine)

1

(ii) bilirubin / pigment / broken down haemoglobin
not 'bile' alone

1

(deposited) in skin
only award if bilirubin / pigment / broken down haemoglobin given
allow carried in the blood

1

[6]

Q17.

(a) B = rib

1

C = diaphragm

1

(b) (i) D

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allow lower case

1

(ii) carbon dioxide

1

[4]

Q18.

(a) (i) A **or** C

allow lower case

1

(ii) B **or** D

allow lower case

1

(b) (i) 60

1

(ii) 4

1

(c) red blood cells

1

[5]

Q19.

(a) (i) increased / thick(er)

allow more / wide(r) / broad

1

(ii) decreased

1

(b) 1

IGNORE working or lack of working

*correct figures from table 2.1 and 1.1 but no answer / wrong answer = **1** mark*

2

[4]

Q20.

(a) any **three** from:

- rose <u>rapidly</u> (during exercise) / use of approximate figures
- then more slowly (during exercise)

  accept rate (of increase) slows down
- to max 126 / at 5 minutes / end of exercise
- <u>rapid</u> fall (during recovery) **or** use of approximate numbers
- then less rapid fall / use of approximate numbers

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- returned to resting rate (60 bpm) by 11 minutes

3

(b) arteries dilate / widen

accept muscle in wall relaxes

1

(c)

any **four** from:

- muscles using more energy **or** more energy released
- muscles respire faster
- supply more oxygen
- supply more glucose / sugar
- remove more CO_2
- remove lactic acid
- remove heat / to cool

do **not** accept energy produced

allow for aerobic respiration **or** to prevent anaerobic respiration

'more' needed ONCE only for full marks

4

[8]

Q21.

(a) any **two** from:

- transport up / against concentration gradient / low to high concentration
- uses energy
- use of protein / carrier

2

(b) microvilli – large(r) surface area

accept have carriers

1

mitochondria – release energy **or** make ATP

*do **not** accept 'makes energy'*

1

[4]

Q22.

(a) diet **or** description

1

(b) exercise
or group meetings
or same number of kilocalories per day
or time
or group size

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1

(c) any **two** from: eg

- scientists didn't observe amount of exercise
  or volunteers cheated on exercise(*)
- scientists didn't observe the amount of food
  or volunteers cheated on food(*)
  *(*)if no marks awarded for first 2 bullet points allow don't stick to plan **or** cheated for **1** mark*
- mass of subjects not controlled
- age of subjects not controlled
- gender of subjects not controlled
- occupation of subjects not controlled
- different proportions of subjects completed course
  allow not all completed course
- low number of subjects
  ignore not repeated

2

(d) any **two** from: (yes)

- low carbohydrate / Group 1 / people / they lost more mass
  ignore more people lost weight
  allow greater change in mass
- low carbohydrate / Group 1 / people / they lost more body fat
  ignore more people lost body fat
  allow greater change in body fat
- low carbohydrate diet / Group 1 / people / they resulted in more HDL
  allow better HDL to LDL balance
  allow greater change in HDL

2

[6]

Q23.

(a) lipase

allow phonetic spelling
allow lipidase

1

(b) (i) fall **then** rise owtte eg down **then** up

*allow faster **then** slower*
ignore explanations

1

minimum / least / fastest / best / optimum at 39–41(°C)

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allow it falls to 40(°C)
*if no other marks gained, 'falls to an optimum' gains **1** mark*

1

(ii) (yes)

there is no mark for circling 'yes'
*maximum **1** mark if No is circled*

any **two** from:

- less heat / energy / electricity / power required / used / wasted
  ignore lower temperature
- conserves fuel supplies
  or less fuel used
- less pollution from power stations
  owtte
  accept less global warming
  or
  less CO_2 / carbon emissions / greenhouse gases
  or
  less SO_2 / acid rain
  ***NB** only direct effects*
  less pollution only is not enough

2

(c) any **two** from:

*max **1** mark for reference to cell*

- enzyme / lipase
  accept any named enzyme
- destroyed / denatured
  allow damaged / broken down
  ***not** 'killed'*
- reference to (specific) shape changed
  ignore detergent / it

2

[7]

Q24.

(a) (i) red cell

1

(ii) diffusion

1

(iii) haemoglobin

1

(iv) a nucleus

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1

(b) (on diagram) arrow from any part of blood to air

1

[5]

Q25.

(a) any **two** from:

- large surface / area **or** many villi **or** have microvilli
  accept big surface / area
- thin surface **or** thin wall **or** surface 1-cell thick **or** capillaries near surface **or** permeable **or** partially permeable
  accept they are thin
  *do **not** allow thin **cell** wall*
- many blood vessels **or** many capillaries **or** capillary network **or** good blood supply
  ignore 'constant blood flow' owtte
  ignore extras eg moist or reference to gases
- have enzymes
  ignore release enzymes
  - *accept reference to lacteal as 5th point*
  - *allow reference to having mitochondria*

2

(b) (i) small(er) (surface area) / flat(ter) / short(er) **or** not as folded **or** fewer capillaries owtte
allow small(er) lacteal
ignore references to wide / thick / spread out etc

1

(ii) less absorption (of digested food) / less digestion / diffusion
accept slower for less
accept description of less digestion
accept less food can get in
*do **not** allow zero absorption*
*do **not** allow 'collection' of nutrients*

1

[4]

Q26.

(a) being overweight
*do **not** accept fat unqualified*
allow BMI over 25

1

(b) (i) rose

1

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by 8% / from 16% to 24% / by 50% / rapidly then more slowly

1

(ii) any **two** reasonable suggestions

e.g. less active

accept e.g.s like fewer jobs / more cars / less physically demanding employment OWTTE

more food / take-aways / fast food

2

(c) (i) high (blood) cholesterol

*do **not** accept combination of 2 labels*

ignore references to LDL and HDL

1

(ii) answer in range 8-17 inclusive

1

(iii) some deaths related to more than one factor

1

[8]

Q27.

(a) any **two** from:

- birth mass / growth reduced
- smoke contains carbon monoxide

  ignore references to poison
- blood carries less oxygen / fetus receives less oxygen

  *do **not** accept harder for fetus to breathe*

2

(b) (i) it may cause mental illness

1

it may be a 'gateway' drug to more harmful substances

three answers max 1

three answers max 0

1

(ii) it is less addictive than amphetamines, tobacco or alcohol

1

it is not associated with major sociological problems

three answers max 1

four answers max 0

1

[6]

Q28.

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(a) any **three** from:

- water
  allow breathing / oxygen / carbon dioxide
- ions / minerals / salts
  allow sodium / chloride, other ions neutral
- temperature
  allow heat
- blood sugar
- heart rate
- blood pressure
  ignore urea

3

(b) contraceptive drug

1

fertility drug

1

(c) (i) eg nicotine, alcohol, cocaine, heroin, painkillers, tranquilisers, LSD
allow cannabis / weed or other alternative names
allow tobacco
ignore smoking / ecstasy

1

(ii) alters body chemistry **or** craving / needing / dependence
allow psychological dependence

1

withdrawal symptoms on stopping
allow withdrawal described
allow 'feel ill without it'

1

[8]

Q29.

red (blood cell)

1

platelet

1

white (blood cell)

1

plasma

1

[4]

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Q30.

(a) correctly labelled on diagram

(i) 'X' on an alveolus

centre of X on the alveolus wall or inside the alveolus

***not** if the centre is outside*

1

(ii) arrow pointing downwards

accept anywhere but must point down

1

(b) in sequence

1 trachea

2 bronchi

3 bronchioles

4 alveoli

1

(c) diffusion

accept positive indicator

1

[4]

Q31.

(a) in sequence

starch

1

sugar

1

protein

1

<u>amino</u> acids

1

(b) (too large **or** insoluble

*do **not** accept "breaking up"*
*do **not** accept complex*

accept 'need to make molecules smaller / soluble' – reverse argument

1

cannot be absorbed **or**
cannot enter blood **or**
cannot pass through wall / lining of intestine / gut or villi

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"body" not enough
***not** large intestine*

1

(c) mouth

accept positive indication

1

(d) enzymes

allow catalysts
*do **not** accept <u>catalase</u>*

1

[8]

Q32.

(a) lipase

1

(b) fatty acid

ignore glycerol

1

(c) (i) 0.25 or $\frac{1}{4}$

if <u>correct</u> answer ignore working or lack of working

$\frac{(8.7 - 7.7)}{4}$ *for **1** mark*

2

(ii) fats emulsified **or** described re. Small droplets **or** large S.A. (for enzyme action) **or** fats 'mix' better with water

*do **not** allow breakdown / breakup unqualified*

1

[5]

Q33.

thicker surface

1

reduced surface area

accept fewer alveoli

1

[2]

Q34.

(i) <u>On diagram:</u>

oxygen arrow to blood from air **and** CO_2 arrow to air from blood

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1

oxygen arrow to red blood cell

1

CO_2 arrow from plasma

1

(ii) diffusion

1

(iii) large surface **or** large area

*do **not** accept space*

1

[5]

Q35.

(a) (i) protease

*accept peptidase **or** named protease*
e.g. pepsin / trypsin
allow 'proteinase'

1

(ii) amino acids

accept peptides / polypeptides / peptones

1

(b) points plotted accurately

± $\frac{1}{2}$ *square*

*deduct **1** mark per error*

2

best fit curve **or** ruled point-to-point

if double line within $\frac{1}{2}$ *square*
allow sharp apex
*do **not** allow single straight line*
if no points line defines points
*if (5,0) not plotted only penalise **1** mark*
*bar graph wide bars – **no** marks*

bar graph ± $\frac{1}{2}$ *square max **2** for points*

1

(c) (i) 2 **or** correct from candidate's graph

± $\frac{1}{2}$ *square*

1

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(ii) stomach

1

(d) proteins are large / product is small

1

proteins (may be) insoluble / product is soluble

1

cannot be absorbed / cannot enter blood **or** cannot pass through gut lining
accept reverse referring to product

1

[10]

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